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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,247	08/27/2001	Takamasa Ito	NEC 2360	6115

7590 12/24/2003

Norman P. Soloway  
HAYES, SOLOWAY, HENNESSEY,  
GROSSMAN & HAGE, P.C.  
175 Canal Street  
Manchester, NH 03101

EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 12/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/940,247

Applicant(s)

ITO, TAKAMASA

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/940247.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 11/21/2003 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeng et al (US 6,251,777) in view of Bulat et al (US 4,713,358)

Jeng discloses a method for forming metal silicide layer on a gate electrode, a source and drain region on a substrate. This method comprises the steps of:

forming/depositing a metal layer of cobalt 42 over an entire surface of a semiconductor device formed on the substrate 30 (col 10, lines 14-17; fig. 6)

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performing a heat treatment on the metal layer 42 to form a silicidized cobalt layer on the source/drain region and the gate electrode 36 (col 9, lines 56-59; fig. 6)

stripping/etching the unreacted cobalt layer 44a by a wet chemical solution comprising hydrochloric, hydrogen peroxide and water having a concentration ratio of 1:1:5 at a solution temperature of 50<sup>0</sup> C for a time period of 8 minutes (overlaps the claimed range of 1-20 minutes) (col 11, lines 1-3, col 12, lines 1-3; fig. 7 shows the etching step removes the unreacted layer 44a without removing the silicide layer 46a, which reads on etching away an unreacted cobalt film using an etching solution consisting essentially of hydrochloric, hydrogen peroxide and water having relative concentration ratio of 1:1:5

Jeng differs from the instant claimed invention as per claim 1 by conducting the etching using the solution at 50<sup>0</sup> C instead of at 25-45<sup>0</sup> C.

However, Bulat discloses a method for fabricating transistor comprises the step of etching to remove metal layer 35 (cobalt) using an etching solution comprises of hydrochloric, hydrogen peroxide at 25<sup>0</sup> C (col 4, lines 52-54)

Since both Jeng and Balut are concerned with method of etching unreacted cobalt silicide using a solution includes hydrochloric, hydrogen peroxide and water, one skilled in the art would have found it obvious to modify Jeng's etching step by conducting the etching using the solution at 25<sup>0</sup> C as per Bulat because Bulat states that for removing the unreacted metal layer without disturbing the metal silicide, the wafer is placed in a hydrochloric and hydrogen peroxide solution at a temperature of about 25<sup>0</sup> C (col 4, lines 51-55)

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Regarding claim 2, Jeng discloses forming a cobalt silicide layer (col 10, lines 17-19)

Regarding claim 3, Jeng discloses performing the heat treatment at a temperature ranging from 500-575<sup>0</sup> C.

Regarding claims 4-5, Jeng discloses the step of thermal annealing the cobalt silicide layer of about 800<sup>0</sup> C (col 12, lines 8-10)

### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-

0661.



LV

December 17, 2003